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09/994,476

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Ari Juels

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10/10/2006

DALY, CROWLEY, MOFFORD & DURKEE, LLP
SUITE 301A
354A TURNPIKE STREET
CANTON, MA 02021-2714

EXAMINER

WILLIAMS, JEFFERY L

ART UNIT

PAPER NUMBER

2137

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/994,476

Applicant(s)

JUELS ET AL.

Examiner

Jeffery Williams

Art Unit

2137

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 July 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2,4-28 and 38-45 is/are pending in the application.
- 4a) Of the above claim(s) 29-37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2,4-28 and 38-45 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 March 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

This action is in response to the communication filed on 7/14/06.

All objections and rejections not set forth below have been withdrawn.

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/14/06 has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6 – 9, 11, 12, 14 – 17, 19 – 23, 26 – 28, and 38 – 44 are rejected under 35 U.S.C. 102(b) as being anticipated by Alabbadi et al., "Integrated Security and Error Control for Communication Networks Using the McEliece Cryptosystem".

1
2 Regarding claim 19, Alabbadi et al. discloses:

3 *receiving a first set of elements* (Alabbadi; page 2, col. 1, "Encryption and
4 encoding": Step 2);

5 *and selecting a polynomial for encoding the item under the first set of elements to*
6 *generate an order-invariant fuzzy commitment of the item* (Alabbadi; page 2, col. 1,
7 "Encryption and encoding": Step 3; page 1, col. 2, par. 3). Alabbadi discloses creating a
8 commitment through the use of the polynomial.

9 *and storing said commitment in a computing device* (Alabaddi, pg. 2, "Encryption
10 and encoding": Step 4).

11
12 Regarding claim 20, Alabbadi et al. discloses:

13 *further including inserting chaff points that form a part of the commitment of the*
14 *item* (Alabbadi; page 1, col. 2, par. 2).

15
16 Regarding claim 21, Alabbadi et al. discloses:

17 *receiving a second set of elements* (Alabbadi, page 2, col. 1, "Encryption and
18 encoding": Step 4 – "Decryption and decoding": Step 1); *and selectively decommitting*
19 *the item based upon a level of overlap of the first and second sets of elements*
20 (Alabbadi, page 2, col. 1, "Decryption and decoding": Step 2).

21
22 Regarding claim 22, Alabbadi et al. discloses:

1 *further including determining the polynomial from the second set of elements if*
2 *the level of overlap is greater than a predetermined threshold (Alabbadi, page 2, col. 1,*
3 *“Setup”: Step 1).*

4
5 Regarding claim 23, Alabbadi et al. discloses:
6 *further utilizing an error-correcting code for determining the polynomial (Alabbadi;*
7 *page 1, col. 2, par. 3).*

8
9 Regarding claim 26, Alabbadi et al. discloses:
10 *further including utilizing a decodable design to decommit the item, wherein the*
11 *decodable design includes constituent pairs of sets having a level of overlap less than a*
12 *predetermined level (see rejections for claims 21 and 22).*

13
14 Regarding claim 27, Alabbadi et al. discloses:
15 *further including hiding the first set of elements in a target set containing a*
16 *plurality of elements selected from a field (Alabbadi, page 1, col. 2, par. 2; “Encryption*
17 *and encoding”: Step 3).*

18
19 Regarding claim 28, Alabbadi et al. discloses:
20 *further including projecting the first set of elements onto the target set (Alabbadi,*
21 *page 1, col. 2, par. 2; “Encryption and encoding”: Step 3).*

22

1 Regarding claim 1, Alabbadi et al. discloses:

2 *(a) receiving a first input element comprising a sequence of a least one value*
3 *(a_1, \dots, a_n) from a predetermined set (Alabbadi; page 2, col. 1, "Encryption and*
4 *encoding": Step 2). Alabbadi et al. discloses receiving an input comprising a sequence*
5 *of 'm' vectors from a predetermined set of 'M'.*

6 *(b) generating a codeword of an error-correcting code for generating the*
7 *commitment (Alabbadi; page 1, col. 2, par. 3; page 2, col. 1, "Setup": Step 1).*

8 *(c) constructing a first sequence of coordinate sets (x_i, y_i), for i in $\{1, \dots, n\}$, each of*
9 *the coordinate sets having a first value (x_i) corresponding to a representation of an*
10 *associated one (a) of the at least one value of the first input element and a second*
11 *value (y_i) corresponding to a symbol in the codeword, wherein the symbol corresponds*
12 *to the x_i th symbol in the codeword, wherein an order-invariant fuzzy commitment is*
13 *formed (Alabbadi; page 1, col. 2, par. 3; page 2, col. 1, "Setup": Step 1; page 2, col. 1,*
14 *"Encryption and encoding": Step 3;). Alabbadi et al. discloses that the input elements*
15 *and their corresponding symbols in the codeword are mapped (committed) using a two*
16 *dimensional matrix, thus creating the equivalent of the claimed "coordinate sets".*

17 *outputting the first sequence (Alabaddi, pg. 2, "Encryption and encoding": Step 4).*

18
19 Regarding claim 2, Alabbadi et al. discloses:

20 *wherein the representation of the first value in the first sequence of coordinate*
21 *set is an integer representation (Alabbadi; page 2, col. 1, "Encryption and encoding":*
22 *Step 2). Alabbadi et al. discloses the first value to be a k – bit vector, or bit sequence.*

Regarding claim 6, it is rejected for the same reasons as claim 20.

Regarding claim 7, Alabbadi et al. discloses:

further including adding the chaff as sets of pairs of the form (x,y) such that x does not lie in the input sequence and y is generated at random (Alabbadi; page 1, col. 2, par. 2; page 2, col. 1, "Encryption and encoding": Step 4). Alabbadi et al. discloses the input of pairs of "chaff" elements. X representing intentional user errors of which do not lie in the input sequence, and Y representing channel noise occurring accidentally (random).

Regarding claim 8, Alabbadi et al. discloses:

further including adding the chaff as sets of pairs of the form (x,y) such that one or more values x do lie in the input sequence and y is generated at random (Alabbadi; page 1, col. 2, par. 7).

Regarding claim 9, Alabbadi et al. discloses:

further including reordering the first sequence based upon the first value (Alabbadi; page 2, col. 1, "Setup": Step 2). The first sequence in relation to the first value has been reordered via the permutation matrix.

Regarding claim 11, Alabbadi et al. discloses:

1 *further including applying a bijective function to an input secret to obtain the*
2 *codeword for the symbol corresponding to the second value (Alabbadi; page 2, col. 1,*
3 *"Encryption and encoding": Step 3).*

4
5 Regarding claim 12, Alabbadi et al.:
6 *receiving the first sequence (Alabbadi; page 2, col. 1, "Encryption and encoding":*
7 *Step 2; Davida et al., page 1, col. 1, Introduction; page 1, col. 2; pages 5, 7, and 8);*
8 *selecting a subset of the coordinate sets $\{(x_i, y_i)\}$ in the first sequence (E) such*
9 *that for each pair (x', y') in the subset, the first value in the pair (x') lies in the derived set*
10 *of values (X') (Alabbadi; page 1, col. 2, par. 3; page 2, col. 1, "Setup": Step 1; page 2,*
11 *col. 1, "Encryption and encoding": Step 3;). Alabbadi et al. discloses that the input*
12 *elements and their corresponding symbols in the codeword are mapped (committed)*
13 *using a two dimensional matrix, thus creating the equivalent of the claimed "coordinate*
14 *sets";*

15 *receiving a second input element including a second sequence of a least one*
16 *value (b_1, \dots, b_m) from the predetermined set (Alabbadi; page 2, col. 1, "Encryption and*
17 *encoding": Step 2; "Decryption and decoding"). Alabbadi et al.*

18 *constructing a derived set of values $(X' = x_1', \dots, x_m')$ representing respectively the*
19 *at least one value (b_1, \dots, b_m) in the second sequence (Alabbadi; page 2, col. 1, "Setup":*
20 *Step 1; page 2, col. 1, "Encryption and encoding": Step 3). Alabbadi et al. discloses that*
21 *the input elements and their corresponding symbols in the codeword are mapped*

(committed) using a two dimensional matrix, thus creating the equivalent of coordinate sets.

applying an error-correcting function to the subset (Alabbadi; page 2, col. 1, "Encryption and encoding": Step 3; "Decryption and decoding").

Regarding claim 14, it is rejected for the same reasons as claim 19.

Regarding claims 15 and 16, they are rejected for the same reasons as claim 26.

Regarding claim 17, it is rejected for the same reasons as claim 12.

Regarding claims 38 and 39, they are the computer readable medium embodying the code to implement the method of claims 1 and 12, and they are rejected for the same reasons as claims 1 and 12.

Regarding claim 40, it is rejected for the same reasons as claim 1.

Regarding claims 41, 42, 43, and 44, they contain limitations similar to claims 1 and 12 with the additional limitation of "*constructing a first sequence (E) of coordinate sets (x_i, z_i, y_i) with z_i being "a second value (z_i) constructed in a manner responsive to a pattern of occurrence of the associated one (a_i) of the at least one value of the first input element"*. Thus claims 41, 42, 43, and 44, are rejected for the same reasons as

Art Unit: 2137

claims 1 and 12, and further because Alabbadi et al. discloses the construction of a "coordinate set" comprising a second value (z_i). This second value is provided by the user for each element (m_i) of the first input sequence.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Alabbadi et al.

Regarding claim 10, Alabbadi et al. discloses a method of reordering the first sequence based upon the first value (Alabbadi; page 2, col. 1, "Setup": Step 2). Randomly reordering the sequence would provide a level of obfuscation. Alabbadi does not disclose that the reordering is in ascending order based upon the first value.

However, it would have been obvious to one of ordinary skill in the art to recognize that various methods of reordering the sequence could be used, such as reordering in ascending order. This would be obvious because one of ordinary skill in the art would have been motivated to provide a level of obfuscation to the original

1 sequence and a technique such as reordering in ascending order would accomplish
2 this.

3
4 **Claims 13 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable**
5 **over Alabbadi et al. in view of Rao et al., "Private-Key Algebraic-Code**
6 **Encryptions".**

7 Regarding claim 24, Alabbadi et al. discloses the use of Goppa codes. However,
8 Rao et al. discloses that this causes the system to become susceptible to attacks.

9 Rao et al. shows that one approach to prevent attacks is to use Reed – Solomon
10 Codes instead.

11 Thus, it would have been obvious to one of ordinary skill in the art to employ the
12 teaching of Rao et al. for utilizing a Reed-Solomon error detecting code in the system of
13 Alabbadi et al. This would have been obvious because one of ordinary skill in the art
14 would have been motivated to prevent attacks that would have resulted from employing
15 a Goppa error detecting code.

16
17 Regarding claim 13, it is rejected for the same reasons as claim 24.

18
19
20 **Claims 4, 5, 25, and 45 are rejected under 35 U.S.C. 103(a) as being**
21 **unpatentable over Alabbadi et al. in view of Davida et al., "On Enabling Secure**
22 **Applications Through Off-Line Biometric Identification".**

1 Regarding the following claims, Alabbadi et al. discloses a method of employing
2 error correction within communication networks for the purpose of authenticating users
3 to such networks (Alabbadi et al., page 1, "Introduction").

4 Davida et al. also discloses a method for employing error correction within a
5 communication network for authenticating users to the network. For the purpose of
6 increased security, Davida et al. discloses that it is advantageous to authenticate a user
7 to such networks using the biometric data of the user, such as fingerprint, retinal scan,
8 or iris scan information. In order to utilize the biometric data, Davida et al. discloses that
9 potential users to the system must input a set a biometric data in the form of a biometric
10 template. Then, upon a request for authorization, a user will supply to the system a
11 second set of biometric data that will be compared to the template, the first set (Davida
12 et al., page 1, col. 1, Introduction; page 1, col. 2; pages 5, 7, and 8).

13 It would have been obvious to one of ordinary skill in the art to employ the
14 method of Davida et al. for supplying a biometric template within the system of Alabbadi
15 et al. for authenticating a user to a communications network. This would have been
16 obvious because one of ordinary skill in the art would have been motivated to provide
17 increased security via the utilization of biometric data for authenticating users to a
18 communications network.

19
20 Regarding claim 25, the combination of Alabbadi et al. and Davida et al. disclose:
21 *wherein the first set of elements corresponds to a biometric template* (Davida et
22 al., page 1, col. 1, Introduction; page 1, col. 2; pages 5, 7, and 8).

1
2 Regarding claims 4 and 5, they are rejected for the same reason as 25.

3
4 Regarding claim 45, it contains limitations similar to claims 1, 12, 41, 42, 43, and
5 44. However, the combination of Alabbadi et al. and Davida et al. does not disclose the
6 receiving of a first input comprising two values, each value being derived from a
7 separate predetermined set of values.

8 However, the combination of Alabbadi et al. and Davida et al. does disclose that
9 a system for authenticating a using biometrics may use multiple types of biometrics.
10 The combination discloses that a persons "biometric" for some biometric systems would
11 comprise a iris scan and a finger scan (Davida; page 2, par.3; page 3, par. 5). Thus,
12 the combination of Alabbadi et al. and Davida et al., suggests utilizing multiple types of
13 biometrics to be entered by a user.

14 It would have been obvious to one of ordinary skill in the art to utilize in a
15 biometric authentication system the receiving of a first input comprising two values,
16 each value being derived from a separate predetermined set of values. The two values
17 specifically being derived from a separate predetermined set of biometric values, such
18 as an value for a fingerprint scan and a value for an iris scan. This would have been
19 obvious because one of ordinary skill in the art would have been motivated to utilize
20 authentication inputs comprising two biometric values so as to increase the system's
21 security with unique identification.

22

1

2

Response to Arguments

3

4 Applicant's arguments filed 7/14/06 have been fully considered but they are not
5 persuasive.

6 Applicant's argue primarily that:

7

8 I. *Applicant submits that the Examiner has given no patentable weight to, the claim*
9 *term "an order-invariant fuzzy commitment." As discussed throughout the specification,*
10 *the order of the elements in the sequence used to form the fuzzy commitment does not*
11 *matter. For example, at pages 5-6 of Applicant's specification and exemplary*
12 *embodiment of the claimed invention is described as set forth below ... (Remarks, pg.*
13 12)

14

15 In response, the examiner respectfully asserts that appropriate patentable weight
16 has been given to the claim limitations. For example, the examiner notes that claim 1
17 states method steps *for creating an order-invariate fuzzy commitment*. Prior art meets
18 the limitations as claimed for creating an order-invariate fuzzy commitment.

19

20 II. *Applicant believes that the Examiner has confused error correction used in*
21 *exemplary embodiments of the claimed order-invariant fuzzy commitment and error*
22 *correction in Alabbadi. The Alabbadi scheme assumes that the party performing the*

1 *decoding step holds a private key that may be unknown to the encoding party. In*
2 *contrast, the proposed invention requires that the encoding party and decoding party*
3 *substantially share knowledge of the encoding secret. (Remarks, pg. 13)*

4
5 In response to applicant's argument that the references fail to show certain
6 features of applicant's invention, it is noted that the features upon which applicant relies
7 (i.e., *invention requires that the encoding party and decoding party substantially share*
8 *knowledge of the encoding secret*) are not recited in the rejected claim(s). Although the
9 claims are interpreted in light of the specification, limitations from the specification are
10 not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed.
11 Cir. 1993).

12
13 III. *In addition, inserting errors into a ciphertext as taught by Alabbadi is completely*
14 *different than order invariance as claimed. (Remarks, pg. 14)*

15
16 Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount
17 to a general allegation that the claims define a patentable invention without specifically
18 pointing out how the language of the claims patentably distinguishes them from the
19 references.

20
21 IV. *Alabbadi does not teach commitment of a message and is not relevant to order*
22 *invariance as claimed by claimed by Applicant. (Remarks, pg. 1).*

1
2 In response, the examiner points out that the reference of Alabbadi is clear in
3 directing the readers' attention to the use and protection of messages. Additionally, the
4 examiner notes that the above arguments appear to be based on the Applicant's
5 assertion that Alabbadi discloses the use of a public and private key. Thus, according
6 to the applicant, such would not constitute a commitment. However, the examiner
7 points out that the applicant provides no adequate basis for the assertion that a
8 commitment is not formed because an asymmetric key was used. Regarding 'order
9 invariance' the examiner respectfully directs the applicant's attention to the claim
10 limitations and the prior art that is shown to meet the limitations.

11
12 V. *In contrast, Alabbadi teaches that a message m is encrypted under a public key*
13 *PK ; a second party needs a private key SK in order to recover the message m , where*
14 *SK differs from PK . This is in contrast the invention as claimed which requires creating*
15 *an order-invariant commitment of a predetermined set of values. (Remarks, pg. 15)*

16
17 Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount
18 to a general allegation that the claims define a patentable invention without specifically
19 pointing out how the language of the claims patentably distinguishes them from the
20 references.

21 Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not
22 clearly point out the patentable novelty which he or she thinks the claims present in view

1 of the state of the art disclosed by the references cited or the objections made. Further,
2 they do not show how the amendments avoid such references or objections.

3
4 VI. *Further, Alabaddi does not even remotely teach decommitment made selectively*
5 *on the basis of overlap between the transmitted message c and received message c'.*

6 (Remarks, pg. 15)

7
8 In response to applicant's argument that the references fail to show certain
9 features of applicant's invention, it is noted that the features upon which applicant relies
10 (i.e., *decommitment made selectively on the basis of overlap between the transmitted*
11 *message c and received message c'*) are not recited in the rejected claim(s). Although
12 the claims are interpreted in light of the specification, limitations from the specification
13 are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057
14 (Fed. Cir. 1993).

15 Furthermore, the examiner points out that Alabaddi does disclose *decommitment*
16 *made selectively on the basis of overlap between the transmitted message c and*
17 *received message c'* (Alabaddi, pg. 2, "Decryption and decoding": Step 2).

18
19 VII. *For example, claim 6 requires adding chaff to the first sequence. In the McEliece*
20 *scheme and Alabaddi schemes, a message is converted into a codeword and then*
21 *perturbed, i.e., errors are introduced. This is completely different than adding chaff to*
22 *the first sequence as claimed.* (Remarks, pg. 15)

Applicant's arguments fail to comply with 37 CFR 1.111(b) because they amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

Applicant's arguments do not comply with 37 CFR 1.111(c) because they do not clearly point out the patentable novelty which he or she thinks the claims present in view of the state of the art disclosed by the references cited or the objections made. Further, they do not show how the amendments avoid such references or objections.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

See Notice of References Cited.

A shortened statutory period for reply is set to expire 3 months (not less than 90 days) from the mailing date of this communication.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeffery Williams whose telephone number is (571) 272-7965. The examiner can normally be reached on 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Emmanuel Moise can be reached on (571) 272-3865. The fax phone

Art Unit: 2137

number for the organization where this application or proceeding is assigned is (703)
872-9306.

Information regarding the status of an application may be obtained from the
Patent Application Information Retrieval (PAIR) system. Status information for
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J. Williams
AU: 2137

JW


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SUPERVISORY PATENT EXAMINER